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EXAMINER	
ABDELNOUR, AHMED F	
ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/519,061	VAN OVERVELD ET AL.
	Examiner	Art Unit
	Farras Abdelnour	2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-14 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-14 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 December 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date August 17, 2005.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 020776928, filed on July 4, 2002.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Section IV.C, reads as follows:

> While abstract ideas, natural phenomena, and laws of nature are not eligible for patenting, methods and products employing abstract ideas, natural phenomena, and laws of nature to perform a real-world function may well be. In evaluating whether a claim meets the requirements of section 101, the claim must be considered as a whole to determine whether it is for a particular application of an abstract idea, natural phenomenon, or law of nature, rather than for the abstract idea, natural phenomenon, or law of nature itself.
>
> For claims including such excluded subject matter to be eligible, the claim must be for a practical application of the abstract idea, law of nature, or natural phenomenon. Diehr, 450 U.S. at 187, 209 USPQ at 8 ("application of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection."); Benson, 409 U.S. at 71, 175 USPQ at 676 (rejecting formula claim because it "has no substantial practical application").
>
> To satisfy section 101 requirements, the claim must be for a practical application of the Sec. 101 judicial exception, which can be identified in various ways:
>
>> The claimed invention "transforms" an article or physical object to a different state or thing.
>>
>> The claimed invention otherwise produces a useful, concrete and tangible result, based on the factors discussed below.

<u>Claims 1-8</u> are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 1-8 recite the mere manipulation of data or an abstract idea, or merely solves a mathematical problem without a limitation to a practical application. A practical application exists if the <u>*result*</u> of the claimed invention is "useful, concrete and tangible" (with the emphasis on "result")(Guidelines, section IV.C.2.b). A "useful" result is one that satisfies the utility requirement of section 101, a "concrete" result is one that is "repeatable" or "predictable", and a "tangible" result is one that is "real", or "real-world", as opposed to "abstract" (Guidelines, section IV.C.2.b)). Claims 1-8 merely manipulates data without ever producing a useful, concrete and tangible result. The claim merely describes manipulating N-dimensional data stored in a computer into a new set of data without suggesting practical usage.

In order to for the claimed product to produce a "useful, concrete and tangible" result, recitation of one or more of the following elements is suggested:

- The manipulation of data that represents a physical object or activity transformed from outside the computer.
- A physical transformation outside the computer, for example in the form of pre or post computer processing activity.
- A direct recitation of a practical application;

Applicant is also advised to provide a written explanation of how and why the claimed invention (either as currently recited or as amended) produces a useful, concrete and tangible result.

Claims 9-11 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 9-11 define computer programs embodying functional descriptive material. However, the claim does not define a computer-readable medium or memory and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). That is, the scope of the presently claimed computer programs can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests amending the claim to embody the program on "computer-readable medium" or equivalent in order to make the claim statutory. Any amendment to the claim should be commensurate with its corresponding disclosure.

Claim 14 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 14 recites a mere compilation of data which does not impart functionality to a computer or computing device, and is thus considered nonfunctional descriptive material. Such nonfunctional descriptive

material, in the absence of a functional interrelationship with a computer, does not constitute a statutory process, machine, manufacture or composition of matter and is thus non-statutory per se.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-5, and 9 rejected under 35 U.S.C. 102(e) as being anticipated by Bajaj *et al.*, US 6438266 ("Encoding images of 3-D objects with improved rendering time and transmission processes").

Regarding Claim 1, Bajaj discloses a method of transforming a computer representation of an N-dimensional first object into a computer model of the first object ("This invention relates to topology and geometry compression and coding schemes used in interactively creating, manipulating and transmitting 3-D geometry," column 1, line 11), characterized in that the computer model transformation comprises the step of

generating a cellular space model having a first cell belonging to a first manifold having a dimension which is equal to N ("Unit 14 contains in software a graphics engine which receives the video signal representing the object in 3-D and converts it into a 3-D topological contouring structure," column 6, line 9), and a second cell belonging to a second manifold having a lower dimension which is equal to N-1 situated on a border of the first manifold ("A rendering engine in unit 14 transforms the data representing the 3-D object to data representing 2-D images," column 6, line 17), and an edge between the first cell and the second cell to which an indicator is assigned, which indicates whether the second manifold forms part of the border of the first manifold ("Focusing on the strip that connects the vertices of layer i to the vertices of layer i+1, all the triangles that have two vertices on the i.sup.th layer are marked with a 0 (referred to as parent march); and all the triangles that have two vertices in the (i+1).sup.th layer are marked with a 1 (referred to as child march)," column 8, line 5).

Regarding Claim 2, Bajaj discloses a transformation method as claimed in claim 1, characterized in that a third cell belonging to a third manifold is added to the cellular space model for a computer representation of a second object ("Unit 14 contains in software a graphics engine which receives the video signal representing the object in 3-D and converts it into a 3-D topological contouring structure," column 6, line 9).

Regarding Claim 3, Bajaj discloses a transformation method as claimed in claim 2, characterized in that a three- dimensional video cube consisting of two-dimensional

images associated with consecutive instants and being placed one after the other is partitioned into a first object and a second object ("VRML and MPEG-4 BIFS are current industry standards applicable to 3-D encoding. They allow copies of individual 3-D objects to be placed in a scene after spatial or property transformation," column 14, line 31), and in that the transformation generates a first cell and a third cell, the dimension of the first manifold and the third manifold being at most three ("A rendering engine in unit 14 transforms the data representing the 3-D object to data representing 2-D images," column 6, line 17).

Regarding Claim 4, Bajaj discloses a transformation method as claimed in claim 3, characterized in that the transformation assigns a value to the indicator on the basis of a computation of at least one geometrical property, derived from values of the computer representation ("A rendering engine in unit 14 transforms the data representing the 3-D object to data representing 2-D images," column 6, line 17. Number of dimension of an object is a geometrical property of the object).

Regarding Claim 5, Bajaj discloses a transformation method as claimed in claim 4, characterized in that the transformation assigns a value to the indicator on the basis of a computation of a change with respect to time of the surface, of a cross-section of the first object with a plane of a two- dimensional image in the video cube at an instant ("In accordance with the invention, the displacement of vertex positions as a function of

time may be efficiently represented as a sequence of GDLs applied repeatedly to a given instance of object geometry," column 15, line 63).

Regarding Claim 9, Bajaj discloses a computer program for performing a method of transforming a computer representation of an N-dimensional first object into a computer model of the first object ("The operating system software, the software constituting the graphics engine, the rendering engine, the processes for decomposition, compression, encoding and progressive transmission, can be stored in memory 3, secondary storage 4 and/or external store 6," column 6, line 46), characterized in that the transformation to the computer model comprises the step of generating a cellular space model having a first cell belonging to a first manifold having a dimension which is equal to N ("Unit 14 contains in software a graphics engine which receives the video signal representing the object in 3-D and converts it into a 3-D topological contouring structure," column 6, line 9), and a second cell belonging to a second manifold having a lower dimension which is equal to N-1 situated on a border of the first manifold ("A rendering engine in unit 14 transforms the data representing the 3-D object to data representing 2-D images," column 6, line 17), and an edge between the first cell and the second cell to which an indicator is assigned, which indicates whether the second manifold forms part of the border of the first manifold ("Focusing on the strip that connects the vertices of layer i to the vertices of layer i+1, all the triangles that have two vertices on the i.sup.th layer are marked with a 0 (referred to as parent march); and

all the triangles that have two vertices in the (i+1).sup.th layer are marked with a 1 (referred to as child march)," column 8, line 5).

Regarding Claim 12, Bajaj discloses an apparatus for transforming a computer representation of an N-dimensional first object into a computer model of the first object ("A generalized 3-D object 10 is scanned by a video camera 11. The signal from video camera 11 is directed to a sending station 12 with a computer and data processor 13 having the general construction as shown in FIG. 2," column 5, line 65), the apparatus comprising

acquiring means for acquiring the computer representation of the first object ("A generalized 3-D object 10 is scanned by a video camera 11," column 5, line 65); processing means for transforming the computer representation of the first object; and

output means for outputting the computer model ("As seen in FIG. 2, computer and data processor 13 includes a processor 2, a memory 3 and secondary storage 4 which is a machine-readable medium such as a hard disk drive," column 6, line 31),

characterized in that the processing means are capable of generating a cellular space model with a first cell belonging to a first manifold having a dimension which is equal to N ("Unit 14 contains in software a graphics engine which receives the video signal representing the object in 3-D and converts it into a 3-D topological contouring structure," column 6, line 9), and a second cell belonging to a second manifold having a lower dimension which is equal to N-1 situated on the border of the first manifold ("A rendering engine in unit 14 transforms the data representing the 3-D object to data

representing 2-D images," column 6, line 17), and an edge between the first cell and the second cell, and are capable of assigning an indicator to the edge, which indicates whether the second manifold forms part of the border of the first manifold ("Focusing on the strip that connects the vertices of layer i to the vertices of layer i+1, all the triangles that have two vertices on the i.sup.th layer are marked with a 0 (referred to as parent march); and all the triangles that have two vertices in the (i+1).sup.th layer are marked with a 1 (referred to as child march)," column 8, line 5).

Regarding Claim 13, Bajaj discloses a video decompression apparatus for decompressing a compressed video signal to a computer representation of an N-dimensional object, the video decompression apparatus comprising: acquiring means for acquiring the compressed video signal ("There, the transmitted signal is decoded in a data signal decoding and reconstruction unit 18 which may be, for example, a suitably programmed machine such as computer and data processor 13. The 3-D image is displayed on a screen which might be a computer monitor 19," column 6, line 26); processing means for generating the computer representation on the basis of the compressed video signal ("the transmitted signal is decoded in a data signal decoding and reconstruction unit 18," column 6, line 26), and - output means for outputting the computer representation, characterized in that the processing means have access to a cellular space model ("In the most general implementation of the 3-D model animation using GDLs, the decoder stores all transmitted frames of geometry data for a given topology (of a polygonal mesh) and a given GDL for a given frame is signaled to be

applied to any of the stored frames of geometry date to form the model for the current frame," column 16, line 33).

Regarding Claim 14, Bajaj discloses a data representation comprising a cellular space for representing a digitized N-dimensional object, characterized in that an indicator is assigned to an edge between a first cell and a second cell of the cellular space, which indicator indicates whether the second manifold having a lower dimension forms part of a first manifold having a higher dimension, said first and second manifolds being represented by the first and the second cell, respectively ("Focusing on the strip that connects the vertices of layer i to the vertices of layer i+1, all the triangles that have two vertices on the i.sup.th layer are marked with a 0 (referred to as parent march); and all the triangles that have two vertices in the (i+1).sup.th layer are marked with a 1 (referred to as child march)," column 8, line 5).

5. Claims 6-8, 10, and 11 rejected under 35 U.S.C. 102(b) as being anticipated by J. Li *et al.* (Li, J.; Kuo, C.C.J., "Progressive compression of 3D graphic models," Multimedia Computing and Systems '97. Proceedings, IEEE International Conference on, vol., no., pp.135-142, 3-6 June 1997).

Regarding Claim 6, Kuo discloses a compression method of transforming a computer representation of an N- dimensional object into a compression model of the object, characterized in that the transformation makes use of a cellular space model

("To make the overall compression scheme progressive, both structure and attribute data have to be compressed progressively. This can be implemented by building a hierarchical structure for a 3D graphic model. To be more precise, we make multiple passes through all vertices in the original mesh to organize vertices into a layered structure. The removal of a vertex and all triangles depending on the vertex from a coarse resolution layer results in a hole in the mesh. This hole is filled by local re-triangulation as shown in Fig. 1," page 136, section 2, column 1).

Regarding Claim 7, Kuo discloses a method of decompressing a compressed video signal to a computer representation of an N-dimensional object, characterized in that the decompression makes use of a cellular space model ("Since both the encoder and the decoder have the full knowledge of the structure of the updated mesh, one can grow a neighborhood by specifying a root triangle followed by a local growing path, page 137, section 3, column 2").

Regarding Claim 8, Kuo discloses a method of transforming a first cellular space model having a first plurality of cells into a second cellular space model having a second plurality of cells, characterized in that the first plurality of cells is different from the second plurality of cells ("To make the overall compression scheme progressive, both structure and attribute data have to be compressed progressively. This can be implemented by building a hierarchical structure for a 3D graphic model. To be more precise, we make multiple passes through all vertices in the original mesh to organize

vertices into a layered structure. The removal of a vertex and all triangles depending on the vertex from a coarse resolution layer results in a hole in the mesh. This hole is filled by local re-triangulation as shown in Fig. 1," page 136, section 2, column 1. Compressing a cellular space results in a second and different cellular space).

Regarding Claim 10, Kuo discloses a computer program for performing a compression method of transforming a computer representation of an N-dimensional object into a compression model of the object (Consult Section 6, pages 140-141, for a discussion of experimental results and computer implementation), characterized in that the transformation makes use of a cellular space model ("To make the overall compression scheme progressive, both structure and attribute data have to be compressed progressively. This can be implemented by building a hierarchical structure for a 3D graphic model. To be more precise, we make multiple passes through all vertices in the original mesh to organize vertices into a layered structure. The removal of a vertex and all triangles depending on the vertex from a coarse resolution layer results in a hole in the mesh. This hole is filled by local re-triangulation as shown in Fig. 1," page 136, section 2, column 1).

Regarding Claim 11, Kuo discloses a computer program for performing a method of decompressing a compressed video signal to a computer representation of an N-dimensional object (Consult Section 6, pages 140-141, for a discussion of experimental results and computer implementation), characterized in that the decompression makes

use of a cellular space model ("To make the overall compression scheme progressive, both structure and attribute data have to be compressed progressively. This can be implemented by building a hierarchical structure for a 3D graphic model. To be more precise, we make multiple passes through all vertices in the original mesh to organize vertices into a layered structure. The removal of a vertex and all triangles depending on the vertex from a coarse resolution layer results in a hole in the mesh. This hole is filled by local re-triangulation as shown in Fig. 1," page 136, section 2, column 1).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Farras Abdelnour whose telephone number is 571-270-1806. The examiner can normally be reached on Mon. - Thurs. 7:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian P. Werner can be reached on 571-272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Farras Abdelnour
Examiner
Art Unit 2624

FA

12/10/07

WENPENG CHEN
PRIMARY EXAMINER